SELF ADJUSTING LOCKING PLIERS

This invention relates to a self adjusting mechanism incorporated into a pliers that enables the user to grip and lock the pliers using only one hand during the operation.

BACKGROUND OF INVENTION

Pliers are used in a variety of situations to grip a bolt, nut, wire, or other items. The general design uses the leverage of two elongated pieces having a handle portion at one end and a jaw piece at the other end. Both pieces are connected together at a pivot pin. When the handle portions are squeezed together, the jaws of the pliers grab the object desired. The length of the handle portions determines the amount of gripping power of the jaws.

Various locking mechanisms are on the market, such as the popular vise grips. These locking mechanisms use a series of hinges to lock the jaws of the pliers together. However, while a first hand grips the handles of the pliers, the other hand is used to turn a screw to adjust the locking mechanism. This means that the items to be gripped must be placed into the jaws snugly prior to the adjustment of the locking mechanism. Thus, such a mechanism requires the use of two hands in order to effectively grip and adjust the locking mechanism to lock an item with the vise grips.

SUMMARY OF INVENTION

An object this invention is to overcome the problem of using both hands to lock the pliers. This allows the user to perform other tasks with a free hand prior to and during the gripping and locking of the pliers. The invention overcomes this problem and others by providing pliers that allow for a single hand to hold and lock pliers. The locking mechanism comprises an arc shaped surface connected to one handle, and a hinged pressure contact on the other handle. The user uses a free finger on the hand gripping the pliers to pull a lever on the pressure contract to engage the pressure contact with the arc shaped surface. The contact transfers pressure to the jaws of the pliers to better hold an item in the jaws, while friction at the contact point keeps the handle with the pressure contact from moving with respect to the arc surface.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the invention will now be described in detail in association with drawings of which:

FIG. **1** is a perspective view of the pliers in an unlocked position.

FIG. **2** is a view in the direction of line **2**—**2** in FIG. **1**.

FIG. **3** is perspective view of the pliers in a locked position.

FIG. **4** is a perspective view of a second embodiment of the invention in the unlocked position.

FIG. **5** is a view in the direction of line **5**—**5** in FIG. **4**.

FIG. **6** is a cut away view showing the gearing of the pliers according to the second embodiment.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the FIG. **1**, pliers according to a first embodiment of the invention has a pair of elongated members **190** and **195** hinged connected together by a plier hinge pin **130**. Jaw member **110** is the upper portion of elongated member **195** and jaw member **120** is the upper portion of elongated member **190**. A work piece **100** may be inserted between the jaw members. Elongated member **190** has a lower handle portion **150** and elongated member **195** has a lower handle portion **140**. A user of the pliers grips the pliers at handle members **140** and **150** as shown by the ghost hand in FIG. **1**. Upon a squeezing of the handles together, the jaw members **110** and **120** are brought together by virtue of hinge pin **130**, thus clamping down on work piece **100**. The length of the pliers from hinge pin **130** to the place where the user grips the handle members determines the amount of clamping force between jaw members **110** and **120**.

The locking mechanism works using an arc shaped surface **160** on the inside of a locking bar **155**, which is connected to a bottom portion of handle member **150**. Arc shaped surface **160** follows along an imaginary circle having a center at plier hinge pin **130**. On the other handle member **140**, a hinged lever **170** is connected at a bottom end via a hinge pin **135**. A finger lever **175** allows the user to rotate hinged lever **170** with the use of fingers on the hand which hold the pliers. A pressure contact **180** interconnected to hinged lever **170** via a set screw **185** extends away from hinge pin **135**. Set screw **185** is used to adjust how far away from hinged lever **170** pressure contact **180** will extend. As shown in FIG. **2**, pressure contact **180** has a point **185** that travels along the middle width of arc shaped surface **160**.

Ideally, the combination of distances between the center of plier hinge pin **130** to hinge pin **135** and between hinge pin **135** to the tip of pressure contact **185** will be greater than the distance between the center of plier hinge pin **130** and arc shaped surface **160**. Upon rotation of the hinged lever **170** via use of the fingers as shown in FIG. **3**, the pressure contact **180** contacts arc shaped surface **160**. By friction at this contact point, pressure contact **180** does not move with respect to arc shaped surface **160**. Upon continual rotation of hinged lever **170** to a position where finger lever **175** is parallel with handle member **140** and pressure contact **180** extends along a line parallel to the handle member **140**, handle member **140** is brought closer together to opposing handle member **150**, which provides an increased clamping force between the jaw members **110** and **120**. Note how handle members **140** and **150** are closer as shown by angle β together in FIG. **3** compared with angle α from FIG. **1** upon the locking of the pliers via the rotation of finger lever **175**. As long as the user continually squeezes the handle members **140** and **150** and simultaneously holds finger lever **175** parallel to the handle member **140**, jaw members **110** and **120** are locked in a clamping position, securing work piece **100**. Further, the rotation of the hinged lever **170** provides a mechanism for applying more torque between the jaw members **110** and **120** than the user could by only squeezing the handle members **140** and **150** together.

In FIGS. **4**–**6**, another embodiment according to the invention is shown. Rather than the jaw members being in a direction relatively parallel the elongated members as was shown in the first embodiment, this embodiment uses a pair of jaw members **545** and **555** which are relatively perpendicular to elongated members **540** and **550** (Shown in FIG. **4**).

The pliers comprises an upper jaw member **555** and a lower jaw member **545**. The upper jaw member is integrally connected to elongated member **550**. As shown in FIG. **6**, the lower jaw member **545** is hinge connected to elongated member **550** via a jaw pin **630**, which allows lower jaw member **545** to rotate about jaw pin **630** to clamp onto items place between upper and lower jaw members **555** and **545**. Lower jaw member **545** has jaw gears **620** which are operably connected to elongated member **540** via gears **600**. The interaction of jaw gears **620** and gears **600** provide that